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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/395,490	09/14/1999	ROBERT EVEREST JOHNSON	LUT-2-0023	6096

48116 7590 08/29/2006

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EXAMINER	
BURD, KEVIN MICHAEL	

ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 08/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/395,490	JOHNSON ET AL.	
	Examiner	Art Unit	
	Kevin M. Burd	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28 and 30-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-13,15-25,27,30-34* is/are rejected.

7)☒ Claim(s) *6,14 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. This office action, in response to the remarks filed 6/16/2006, is a final office action.

Response to Arguments

2. Applicant's arguments filed 10/4/2005 have been fully considered but they are not persuasive for claims 1-5, 7-13, 15-25 and 30-34.

Regarding the rejection of claim 1, Shin discloses the predistorter and control system will receive the input signal 101 and the feedback signal 103. The predistorter will remove the out-of-band signals on line 103. This removes the distortion created by the amplifier. Thus, in effect, the predistorter receives the exact signal that is to be transmitted and the control system receives the signal that was transmitted in order to ensure the predistorter correctly compensates for the distortion by the amplifier.

Applicant states Shin does not disclose that predistortion is applied to a base band signal. Shin implies that the predistortion technique is applied to an RF signal. Down conversion of signal is well known in the art as shown by Jones in figure 2. Predistorting an RF signal at base band would only require the addition of one of these components. This does not render the combination non-obvious.

Regarding the rejection of claim 9, Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency as stated in the previous office action.

Regarding the rejection to claim 16, Applicant states claim 16 is a means-plus-function claim. Such claims need to be interpreted in light of the specifications, which the examiner has not done. It is unclear what limitations from the specifications the examiner has not included in the rejection of claim 16.

Regarding claims 17, 21 and 30, Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency as stated in the previous office action. In addition, Shin discloses the predistorter and control system will receive the input signal 101 and the feedback signal 103. The predistorter will remove the out-of-band signals on line 103. This removes the distortion created by the amplifier. Thus, in effect, the predistorter receives the exact signal that is to be transmitted and the signal that was transmitted in order to ensure the predistorter correctly compensates for the distortion by the amplifier.

The rejections of claims 1-5, 7-13,15-25, 27 and 30-34 are maintained and restated below.

3. The previous claim objection is withdrawn in view of the claim amendment.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said

subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543).

Regarding claim 27, Jones discloses an apparatus and method for adaptively predistorting a base band signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). Filtering the signals eliminates high frequency harmonics in the system (column 4, lines 35-47). The output of the interpolator is a predistorted upsampled signal, which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Jones does not disclose the receiver being tuned to at least one specific frequency offset from a carrier frequency of the output signal. Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency. The feedback control signal on line 109 is coupled to the predistorter 105 for adjusting characteristics of the predistorter and thereby null the energy in the out-of-band signals on line 103 (column 5, lines 33-45). It would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the teachings of Shin into the apparatus and

method of Jones to measure the energy of distortion frequency components and to remove out-of-band signals. This would remove noise from the signal to be transmitted and allow error free transmissions to be sent to the receiver.

5. Claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 28, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543) further in view of Perkins et al (US 5,963,549).

Regarding claims 1, 9, 12, 16, 18, 19, 22, 24, 31 and 32, Jones discloses an apparatus and method for adaptively predistorting a base band signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). Filtering the signals eliminates high frequency harmonics in the system (column 4, lines 35-47). The output of the interpolator is a predistorted upsampled signal, which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Jones does not disclose the receiver being tuned to at least one specific frequency offset from a carrier frequency of the output signal. Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency. The feedback

control signal on line 109 is coupled to the predistorter 105 for adjusting characteristics of the predistorter and thereby null the energy in the out-of-band signals on line 103 (column 5, lines 33-45). It would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the teachings of Shin into the apparatus and method of Jones to measure the energy of distortion frequency components and to remove out-of-band signals. This would remove noise from the signal to be transmitted and allow error free transmissions to be sent to the receiver.

The combination of Jones and Shin does not disclose clipping the signal in the predistorter. Perkins discloses it is well known to clip signals in a predistortion unit to reduce power requirements prior to transmission. Using a lookup table memory technique helps achieve this lower power consumption (column 2, lines 30-44). It would have been obvious for one of ordinary skill in the art at the time of the invention to use the predistortion unit of Perkins to clip a base band signal using a look up memory technique for the reason stated above.

Regarding claims 2 and 10, Jones discloses upconverting the 800 ksps signals to 3.2 Msps signal (column 7, lines 30-45).

Regarding claims 3, 11 and 23, Perkins discloses the I and Q components are summed prior to recovering lookup table information (column 2, lines 30-44).

Regarding claims 8 and 15, the signal is delayed by elements 112, 113 and 115 prior to being output of the system (Jones figure 2).

Regarding claim 28, the combination of Jones and Shin discloses the apparatus stated in paragraph 5. The combination of Jones and Shin does not disclose clipping

the signal in the predistorter. Perkins discloses it is well known to clip signals in a predistortion unit to reduce power requirements prior to transmission. Using a lookup table memory technique helps achieve this lower power consumption (column 2, lines 30-44). It would have been obvious for one of ordinary skill in the art at the time of the invention to use the predistortion unit of Perkins to clip a base band signal using a look up memory technique for the reason stated above.

6. Claims 4, 5, 7, 13, 20, 25 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543) further in view of Perkins et al (US 5,963,549) as applied to claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 28, 31 and 32 above, and further in view of Miyashita (US 6,288,610).

Regarding claims 4, 5, 7, 13, 20, 25 and 33, the combination of Jones, Shin and Perkins disclose an apparatus and method for adaptively predistorting a base band signal as stated above. The combination does not disclose using the lookup table technique to predistort the base band signal where the distortion characteristics are defined by polynomial equations having coefficients. Miyashita discloses the predistortion characteristics are defined by the polynomial equation shown in column 4, lines 60-68. The equation g(x) is the expression of the envelope transfer function. It would have been obvious to incorporate the method of using a polynomial equation from a look up table to predistort a base band signal as disclosed in Miyashita into the combination to correct distortion impairing linearity which occurs in the amplifier (column 3, lines 31-33).

7. Claims 17, 21, 30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543)

Regarding claims 17, 21, 30 and 34, Jones discloses an apparatus and method for adaptively predistorting a base band signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). The output of the interpolator is a predistorted upsampled signal, which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Jones does not disclose the receiver being tuned to at least one specific frequency offset from a carrier frequency of the output signal. Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency. The feedback control signal on line 109 is coupled to the predistorter 105 for adjusting characteristics of the predistorter and thereby null the energy in the out-of-band signals on line 103 (column 5, lines 33-45). It would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the teachings of Shin into the apparatus and method of Jones to measure the energy of distortion frequency components and to

remove out-of-band signals. This would remove noise from the signal to be transmitted and allow error free transmissions to be sent to the receiver.

Allowable Subject Matter

8. Claims 6, 14 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Friday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571) 272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin M. Burd
8/27/2006

KEVIN BURD
PRIMARY EXAMINER